

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
16 January 2003 (16.01.2003)

PCT

(10) International Publication Number
WO 03/004105 A2

(51) International Patent Classification⁷:

A63B

(21) International Application Number: PCT/US02/21054

(22) International Filing Date: 5 July 2002 (05.07.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/303,097 6 July 2001 (06.07.2001) US

(71) Applicant and

(72) Inventor: DISE, David [US/US]; 710 Farnham Drive, Richmond, VA 23236 (US).

(74) Agents: WHITHAM, Michael, E. et al.; Whitham, Curtis & Christofferson, PC, 11491 Sunset Hills Road - # 340, Reston, VA 20190 (US).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW.

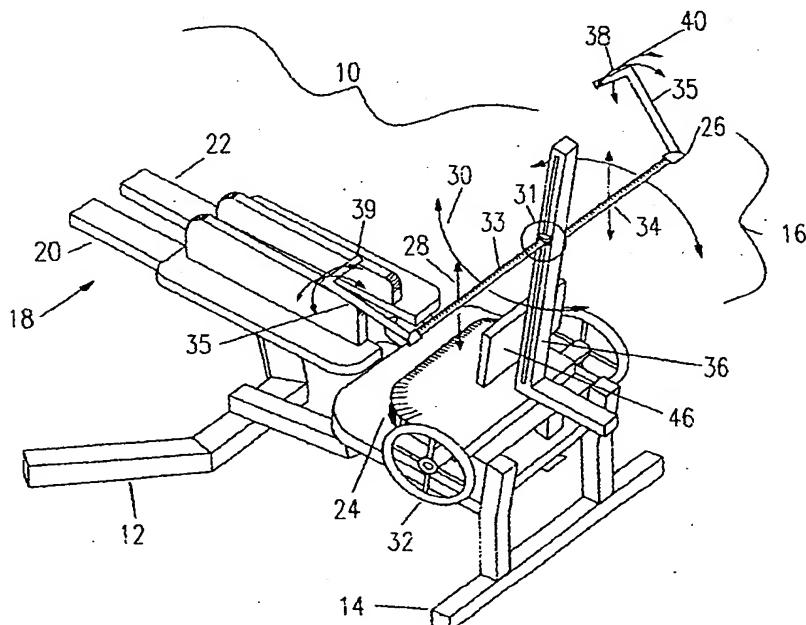
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

..... without international search report and to be republished upon receipt of that report

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(54) Title: EXERCISE MACHINE



(57) Abstract: A stretch therapy apparatus provides for enhanced physical fitness as well as rehabilitation and medical treatment by allowing the user to increase core flexibility and shoulder flexion. The stretch therapy apparatus includes both a hip locking mechanism that retains the user's hips securely so that he or she may then rotate about his or her spine to grasp a grip (i.e., handle, vertical pole, etc.) located outside the opposite hip and preferably located behind the user's opposite shoulder prior to beginning the stretch. One embodiment of the hip locking mechanism allows the user to easily and safely separate his or her legs by 180 degrees or more using a hand crank or motorized mechanism. Alternatively, the hips and pelvis may be locked in place by the legs being restrained and the hips pushed against an object such as the back of a chair. For core flexibility enhancement, preferably the grip is moveable to varying locations so that increases in

the user's flexibility can be realized and positive feedback can be provided. A series of grips may also be used whereby progress is charted by being able to reach to further and further grips. Resistance training may also be employed wherein the grip may be affixed to a weight stack for either pulling the user's arm across his or her chest, or the weight stack can be lifted after achieving the stretch. For shoulder flexion enhancement, the user will grasp a grip located on the same side of his or her body and lift the user's elbow towards vertical.

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EXERCISE MACHINE

DESCRIPTION

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BACKGROUND OF THE INVENTION

Field of the Invention

10 The present invention generally relates to a stretching machine and, more particularly, to a machine for stretching of the back and shoulders.

Description of the Related Art

15 Stretching prior to commencing any exercise regimen is of paramount importance to reduce the likelihood of exercise related injuries. It is important that stretching be carried out with smooth continuous movements, rather than with bouncy movements, in order to avoid injuries during the stretching exercise itself. Ideally, the muscles should be in a relaxed state to maximize the stretch and to avoid undue stress on the muscle, tendons and skeleton.

20 Stretching is also an important part of any physical therapy regimen practiced by patients undergoing physical rehabilitation following an accident, an illness or those seeking relief from common ailments as back pain. This type of therapy is commonly supervised by a highly trained physical therapist in a hospital setting or perhaps in the patient's home. A therapist may, if needed, maneuver the patient's limbs through a full range of motion being careful not to force or over stretch the muscles. The therapist must exercise even greater care and supervision if the patient is using a machine to stretch since a wrong machine setting or a patient who is unaware of his/her thresholds may

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easily over stretch and be injured.

Stretching techniques and exercises help in several key areas. Stretching may help to avoid injury, it may enhance athletic or functional performance and stretching assists in situations where scar tissue is present such as after an injury, surgery or from aging. With a great percentage of the populous going beyond middle age, stretching and flexibility is becoming more important every day.

Traditionally, pre-exercise, post-exercise, as well as therapeutic stretching is done on a floor mat or while standing. In a typical floor stretching exercise, a person lays on his back with his arms stretched out perpendicular to his body. Keeping his shoulders against the ground, the hips are rotated while one leg is brought to touch the ground on the opposite side of the person's body stretching the lower back. This stretch is then repeated on the other leg to achieve balanced flexibility.

Another stretch which is particularly used by golfers involves threading a golf club behind the back but in front of the elbows. Then while standing with legs shoulder width apart, the person will rotate their upper body left and right while keeping their feet firmly planted on the ground. This exercise is to increase a so-called "X Factor" or "Core flexibility," which is the difference in the relative rotation of the hips and the shoulders while making a swinging motion. By increasing the relative difference in rotation, it is believed to impart a whip-like effect to any motion which involves the rotation of the back. As mentioned in "The X-Factor Stretch" in Golf Magazine March, 2001 the concept of an X factor was introduced in 1992 and now is a widely used method to increase the power in a golfer's swing.

In the design and manufacture of exercise and stretching machines there has recently been movement away from using resistance while stretching or exercising the back. When too much resistance or too much external force is used in rotating the back, lower back or spine injury can occur. Having a machine that would provide the means of stretching the back without the risk of injury would aid in increasing flexibility while

keeping the user safe.

Currently there are stretching and exercise machines that secure the hips and pelvis, while the upper torso undergoes strength training.

U.S. Pat. No. 4,678,186 to McIntyre, et al. shows an improved pelvic restraint being provided for use in association with an exercise apparatus which is most suitably a low back exercise apparatus. The pelvic restraint comprises a seat having laterally adjustable hip restraints provided with a belt for extending there between across the abdomen of a user. An adjustable back restraint is also provided for engagement with the lower back. In this fashion, the pelvic restraint prevents lifting or lateral shifting of the hips and forward or rearward pitching of the pelvic area so that more accurate evaluation may be conducted on an exercise apparatus to which the pelvic restraint is secured. While McIntyre provides for the securement of the pelvis, rotational static stretching requires several other attachments.

U.S. Pat. No. 4,893,808 to McIntyre, et al. shows a neck exercising device that allows the user to move his neck in several dimensions against a predetermined resistance. The hips and the pelvis are secured from rotation or movement. However, this device only allows exercise of the neck even though the hips and pelvis are secured.

U.S. Pat. No. 5,110,121 to Foster shows an exercise chair specifically designed to be usable as an ordinary office chair or as a device for exercising the muscles of the lower back. The chair employs both anterior and posterior pelvic restraints to prevent rotation of the pelvic region during an exercise routine. However, Foster does not allow for static stretching for the torso.

U.S. Pat. No. 5,277,681 to Holt shows a leg spreading device which is used for several stretching exercises. One such exercise, involves the securement of the legs to prevent pelvic rotation while the upper torso is rotated by a surrounding frame being moved by hydraulic cylinders. This arrangement does not, however, allow for static, free stretching under the user's own power.

U.S. Pat. No. 5,288,130 to Foster shows a chair specifically designed to be usable as an ordinary office chair. The chair employs both anterior and posterior pelvic restraints to prevent rotation of the pelvic region. Several adjustment devices permit proper movement up and down and back and forward of the arm rests so that they may be used 5 as anterior pelvic restraints during exercise. However, this chair provides no device or attachments for rotational stretching.

These patents as well as U.S. Pat. No. 5,626,547 to Davies, III et al., U.S. Pat. No. 5,529,560 to Davies, III et al., U.S. Pat. No. 5,421,801 to Davies, III et al. and U.S. Pat. 10 No. 5,938,573 to Davies, III et al. all show a device that has a leg spreader and forwardly positioned pole for stretching a user's back muscles.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a stretch therapy apparatus useful for 15 physical fitness, rehabilitation, medical treatment and testing.

It is an object of this invention to provide an improved stretching machine that allows a wide variety of different stretches to be performed safely, and particularly stretches that enhance core flexibility.

It is another object of this invention to provide a stretching machine which can be 20 used for arm, back, and other muscle stretching wherein the different muscles can be stretched individually or together in a coordinated fashion. These muscles include but are not limited to the external abdominal oblique and internal abdominal oblique muscles, the rectus abdominis, the transverse abdominis, the latissimus dorsi, and the longissimus, spinalis and iliocostalis muscles. In addition, it is an object of this invention to provide a 25 stretching machine that can be used for shoulder flexibility enhancement and

rehabilitation which can be used to stretch the deltoids, humerus, teres, latissimus and infraspinatus muscles.

It is another object this invention to provide a stretching machine which provides a hip securement to maximize the stretching effects of rotating the upper torso.

5 It is another object of this invention to provide a stretching machine which provides positive feed-back relating to the progress of the user. In particular, it is an object to provide a machine where a user's core flexibility can be measured and progress towards and enhanced flexibility can be readily ascertained from increased rotational movement towards more distant gripping members or increased movement of a moveable 10 grip member.

It is yet another object of this invention to provide a way of measuring and exercising the posterior rotation of the shoulder.

According to the invention, a stretch therapy apparatus provides a safe and effective means for stretching the torso while the user is in a seated position. The 15 mechanism used for rotational stretching is adjustable and can also be used for stretches or exercises which involve reaching to either side of the body or behind the shoulders. One objective of the stretch therapy apparatus is to increase a user's rotational core flexibility. The torso stretch is made more efficient by the inclusion of a pair of leg decks, leg restraints or other pelvic restraining methods, which lock the hips in a single 20 position. Indicia are provided for positive feedback to the user, as well as to provide a trainer or therapist with stretching assessment information. The machine may also be used to measure shoulder flexion and rotation by indica included on the machine.

By use of the described stretch therapy apparatus, the user is forced to use proper technique while stretching which minimizes risk of injury. Also, by using the described 25 stretch therapy apparatus, the user is able to relax while in a stretching position and accomplish an assisted stretch (which normally requires two people). Stretching is

performed without the user being required to support his or her weight. Stretching can proceed beyond the user's normal range of motion, and is followed by relaxation, and possibly further stretching. In this way, the user may possibly extend his or her range of motion. Indicators are provided on the apparatus to allow determining the user's flexibility, 5 and to allow the user to set goals and track progress in a stretching or exercise regimen.

An important stretching exercise is accomplished by the user sitting in a seat with his hips and pelvis secured from movement or rotation. Then, the user reaches with one hand and grasps a grip (e.g. a handle or bar) that is positioned outside the user's opposite hip. Preferably, the grip is positioned at or moveable to a point that would be behind the 10 opposite shoulder prior to rotation. Thus, in operation the user rotates his or her body about the spine, he or she will grasp a grip and hold onto the grip for a period of time to achieve an assisted stretch. The user's shoulders will be permitted to rotate freely in order to for the user to reach for and grasp the grip, thereby allowing and enhancing the type of rotation used in golf, tennis and other sports. Once resistance or tightness is felt 15 in the rotated torso, the user is to hold the stretch for a set amount of time. This stretch should be done on the both sides of the body to provide balanced flexibility. The user may also pull on the grip while his or her torso is in rotation to enhance the stretch.

In separate embodiments of the invention, the grip may be a single pair of handles adjustable in several planar and rotational dimensions or an array of handles that are 20 positioned at different degrees of rotation to reach.

Another stretch facilitated by the described apparatus pertains to shoulder flexion. While the user is seated in the apparatus, the upper arm is raised to be perpendicular to the torso and then the forearm is rotated until it is as near to being vertical as possible for the user while the user's hand holds onto a grip. This aids in rehabilitating shoulder 25 muscles and provides for increased flexibility.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other objects, aspects and advantages will be better understood from the following detailed description of the preferred embodiments of the invention with reference to the drawings, in which:

5 FIG. 1 is an isometric view of one embodiment of the stretching machine or "stretch therapy apparatus" according to the invention;

FIG. 2 is a top view of the stretching machine shown in FIG. 1;

10 FIG. 3 is an exploded isometric view of one embodiment of a main hinge and support mechanism;

FIG. 4 is an exploded isometric view of an alternate main hinge and support mechanism;

FIG. 5 is an isometric view of the stretching machine with an alternate handle arrangement;

15 FIG. 6 is a side view of the stretching machine with an angularly graduated handle arrangement;

FIG. 7 is a top view of the stretching machine shown in FIG. 6 with an angularly graduated handle arrangement;

20 FIG. 8 is an isometric view of another embodiment of the stretching machine with a hip and pelvis securing system that locks the legs in place;

FIG. 9 is a top down view of the stretching machine with a hip and pelvis securing system that locks the legs in place shown in FIG. 8, as well as three vertical poles on each side of the device;

FIG. 10 is an isometric view of one embodiment of the stretching machine with a

detachable grip and handle support structure;

FIG. 11 is an isometric view of another embodiment of the stretching machine with a detachable grip and handle support structure on the machine with a hip and pelvis securing system that locks the legs in place; and

5 FIG. 12 is an isometric view of one embodiment of the stretching machine of this invention which is used in conjunction with resistance training elements.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

10

Referring now to the drawings, and more particularly to FIG 1, there is shown an isometric view of the stretching machine generally referred to by the reference numeral 10. The support frame of the stretching machine includes front 12 and rear 14 support members which are preferably made from tubular steel or similar sturdy material. In the 15 preferred embodiment, the stretching machine includes both a back and arm stretching component 16 and a leg, thigh, and calf stretching component 18. The leg, thigh, and calf stretching component 18 preferably includes a pair of leg supports, 20 and 22, projecting outward from a seat 24. Leg supports 20 and 22 have a range of motion so that they may be spread from 0 degrees apart to 180 degrees apart. This complete range preferably is 20 provided so that any user, regardless of flexibility in the thigh and groin area, may be able to secure their hips. In the embodiment shown in Figure 1, the back and arm stretching component 16 projects from beneath seat 24, behind the user. An important requirement for core flexibility enhancement is to provide a means for the user to rotate about his or 25 her spine and hold onto a grip positioned outside the hip opposite of his or her hand used to achieve the stretch. In Figure 1, the stretch is achieved by grasping a handle 35 on one

side of the body with the user's hand on the opposite of the body after rotation about the spine. It should be understood that core flexibility enhancement may also be achieved if the handle 35 were located outside of the leg supports 20 and 22. The back and arm stretching component 16 preferably includes a hinge mechanism 26 which allows the user 5 to set the handles 35 to any orientation to maximize the stretching exercises or to give an indication of distance rotated as shown by arrows 40. In addition, the back and arm stretching components 33 and 34 can be pivoted or moved to any angular and vertical orientation with respect to the user's waist as shown by arrows 30 and 28 by hinge mechanism 31. This allows accommodating users of different sizes, shapes, and intrinsic 10 flexibilities. The leg supports, 20 and 22, open and close in a jaw-like fashion to effectively open and secure a user's hips.

In one embodiment of the invention, the legs, back and calf stretching component 18 may be similar or identical to that described in U.S. Patents No. 5,626,547 to Davies, III et al., U.S. Pat. No. 5,529,560 to Davies, III et al., U.S. Pat. No. 5,421,801 to Davies, 15 III et al. and U.S. Pat. No. 5,938,573 to Davies, III et al., each of which are herein incorporated by reference.

A principal objective of this invention is to secure the user's hips so the stretch being performed is as efficient as possible. In order to accomplish this, a user's hips must be prevented from twisting and turning during rotation of the upper torso. When the hips 20 are secure, the user may safely and efficiently stretch his or her back and torso muscles by reaching across his or her body to a handle 35 on the opposite side of the reaching hand and then hold his or her body in rotation. This stretch can be enhanced by pulling against the handle once it is gripped. In the FIG. 1 embodiment, leg supports 20 and 22 accomplish this goal by spreading the user's legs until gentle pressure from the legs 25 oppose spreading the legs any further. The leg supports, 20 and 22, can be moved either under the power of a user's legs, or by a mechanical mechanism such as, for example, a

only 1 plane

5 manual or motorized crank, gear and pulley arrangement 32. Once this is accomplished, the hips can be considered secured. However, it should be understood that other mechanisms for securing the user's hips may be also employed. For example, any mechanism which holds a user's hips squarely against a wall, chair or other support would be a suitable means for restraining the movement of a user's hips.

10 Still referring to FIG. 1, an adjustable back-rest 46 is preferably provided for providing upper and lower lumber support for a user. However, it is preferred that the back-rest 46 be of a size and set at a height which permits the user to rotate his or her shoulders about the spine in order for the user to reach further around the spine to the handle 35 on the opposite side of his or her body. The attitude of the seat 24 can also be adjusted as required for certain exercises. This may be accomplished either by changing the attitude of the seat 24 with respect to the machine 10, or by adjusting the height of either the front 12 or rear 14 support to change the angle of the entire machine 10 and thereby increase the gravity effect on the exercise.

15 Handles 38 and 39 can be provided, and are preferably used to measure or exercise the user's shoulders flexion and rotation while the user is seated in seat 24. To accomplish this, the user's hand is brought up so that the upper arm is parallel to the ground and forearm is parallel to the ground as well as perpendicular to the upper arm. The user does not reach across his or her body for this exercise. While seated in seat 24, 20 the user grasps either grip 38 or 39, depending which shoulder the user is measuring, and rotates his forearm as far to a vertical position as possible. In a preferred embodiment, the motion of 38 and 39 is ratcheted so that a user may ascertain how far back his or her shoulder was rotated.

25 Referring now to FIG 2, the machine 10 is shown in its open configuration illustrating the complete range of horizontal motion. The back and arm stretching component 16 includes an adjustable support beam 33 and 34, which can be adjusted as

shown by arrows 28 and 30. The handles may take multiple forms, for example, a pole adjustable along the length of the support beam (80 in FIG 5), rubber or velcro strips or an end mounted handle 35, which is adjustable by hinge 26 which provides a ratchet mechanism to limit the movement of handle 35 to one direction. The handlebar 35 is 5 rotatable for particular exercises and can achieve orientations between perpendicular to the pole or parallel with the pole as shown by arrow 40.

In operation, the user sits in the seat 24 and selects a particular pole orientation for the back and arm stretching component 16. The user initially secures their hips by cranking the leg supports 20 and 22 so gentle tension is felt in the legs. Then, the user 10 may reach around and grasp handle 35 on the opposite side of the body and push it away from the body. Resistance may be added if desired to oppose the user's movements. A ratchet mechanism 26 may be used which permits movement in only one direction. This allows the user to achieve an assisted stretch by using the handle 35 to rotate his or her body, while the machine 10 holds the user in a stretched position for any desired period of 15 time. The ratchet mechanism 26 may be designed to click at specific intervals, such as, for example, every centimeter. Indicia can be provided on hinge 26 to provide accurate flexibility measurement and positive feedback regarding the distance of the stretch. This allows a patient's progress to be monitored, and allows a user to self monitor his or her progress. Since the user is stretching on his or her own initiative and not under the 20 influence of some outside force, there is no danger of muscle hyper-extension or other stretching related injury. A release lever 44 is provided to release the ratchet mechanism 26 so that the handlebars 35 can be reset for another exercise repetition.

25 **FIG. 3** shows an expanded view of one configuration for a hinge mechanism collectively referred to as 31. The mechanism controls the vertical and angular movement of support beams 33 and 34 in relation to beam 36. On either side of 36 are grooves 53 which guide the vertical motion of 33 and 34. Mechanism 51 limits the

unopposed vertical movement of 33 and 34 to up, and when a downward adjustment is necessary, 51 is merely released. Mechanism 52 secures the angular motion of 33 and 34 while using the stretching device.

FIG. 4 shows an alternate embodiment of the hinge mechanism 31 where locking mechanism 52 (FIG. 3) is eliminated and the function of mechanism 51 is replaced by locking pin mechanism 37. Locking pin mechanism 37 secures support bars 33 and 34 by using a retractable pin to secure the vertical motion of the bars and allows support bars 33 and 34 to be rotated angularly. A wide variety of mechanisms other than those shown in FIGs. 3 and 4 may be used in the practice of this invention. The objective would be to have a grip which is positionable at a location outside the user's opposite hip from his or her gripping hand so that the user can rotate his or her shoulders about his or her spine and grasp a handle for holding a stretch. Preferably, the handle would be positioned at or moveable to a location that would normally be behind the user's opposite shoulder prior to beginning the stretch. In addition, it is preferable to have the handle rigidly placed so that the user may have his or her weight supported while stretching and so that the user may pull against the handle to enhance the stretch. As will be discussed in more detail in conjunction with FIG. 12, the handle might also be combined with a resistance training exercise where the handle is on a wire or cable connected to weights. The weights could be connected so as to pull the user's arm further around his or her body. Alternatively, the user after grasping the handle, and while in a rotated position, could pull the handle to lift the weights.

FIG. 5 shows an alternate embodiment of back, torso and arm stretching component 16. Handles 60 and 61 are adjustable by sliding them along support beams 33 and 34 and secured by knobs 62 and 63 at the base of handles 60 and 61, respectively.

Now referring to FIG. 6 and FIG. 7, an alternate handle arrangement is shown by 17. Instead of a single, adjustable support beam, as in FIG. 1 and FIG. 5, four handles

are arranged in a graduated array with each handle being more angled away from the user than the one below it. Using this arrangement, the user would start on the lowest bar 19 and work his way back to the furthest reachable bar. A numbering system for the bars would be employed to provide positive feedback as well as a indicator of progress.

5 Handle array 17 is preferably vertically adjustable by raising and lowering mechanism 83 which may secure handle array 17 by a retractable pin which allows handle array 17 to be raised and lowered for different users. FIG. 7 provides a top down view of the alternate embodiment pictured in FIG. 6.

10 FIG. 8 shows an alternate method for securing of a user's hips and pelvis. The feet are placed on foot rests 85 with the user's legs under leg restrainers 86 and 88. Then, preferably using a hinge and ratchet mechanism 88, leg restrainers 86 and 87 are brought down closer to seat 24 so that the legs and the pelvis of the user are restricted from moving or rotating. This accomplishes the securing of the hips and pelvis, so back and arm stretching component 16 may then be used to stretch the torso or shoulders in the 15 same manner as discussed in conjunction with FIG. 1 (it being understood that like numerals in the figures performing like functions).

20 FIG. 9 shows the alternate method for securing of a user's hips and pelvis, as shown in FIG. 8, as well as an alternate arrangement of handles. The handles 70, 71 and 72 are vertical poles that are situated three to a side and numbered so that the user may track his progress in the rotational stretch. It being understood that more or less vertical poles may be used in conjunction with the present invention. In operation, a user would, while his hips are secured, rotate his or shoulders about the spine and grasp one of the handles 70, 71 and 72 on the opposite side of his or her body. Because the handles 70, 71 and 72 are vertical, user's of virtually any height can be accommodated (i.e., they can 25 grasp the handles 70, 71, and 72 at any vertical height). In addition, the user may exercise different muscle groups while reaching to relatively higher or lower heights on the

handles 70, 71 or 72. As discussed previously, once one of the handles 70, 71 or 72 is grasped, the user will hold the stretch as long as comfortable. Alternatively, after grasping the handle 70, 71 or 72, the user may pull on the handle to enhance the torso stretch.

5 **FIG. 10** shows an alternate embodiment of exercise machine 10 where the handle array is independent from the waist securing portion. Preferably, the handle array could be attached to the machine by clamps 64 and 65 at the rear support 14 so that the back, torso and arm stretching component 16 may be stable during the stretching exercise. The embodiment shown in **FIG. 10** uses legs decks 20 and 22 to secure the hips and the pelvis 10 during the stretching exercise. This embodiment illustrates how the back and arm stretching component 16 may be added to any existing hip and pelvis locking device. Hence, gymnasiums and physical therapy or rehabilitation centers might utilize the back, torso, and arm stretching component 16 on an existing machine as a retro-fit, thus minimizing floor space and other requirements for the stretch therapy apparatus described 15 herein.

FIG. 11 describes a similar detachable handle arrangement 16 as in **FIG. 10** but with hips and pelvis securement method described in **FIG. 8**.

20 **FIG. 12** shows an alternate embodiment of the invention that uses weight stacks 60 to induce rotation of the torso. Once the hips are secured by leg decks 22 and 20 or by a similar method (hip securement of **FIG. 8**), grip 61 is grasped by the hand on the opposite side of the body and pulled toward the center, raising the weights 60. Then the user may relax his muscles and have his torso rotated in an assisted stretch. The stretch may then be held for a period of time.

25 While the invention has been described in terms of its preferred embodiments, those of skill in the art will recognize that the invention can be practiced with considerable variation within the spirit and scope of the appended claims.

CLAIMS

I claim:

1. A stretching apparatus, comprising:
 - 2 a seat having a front side, back side, left side and right side;
 - 3 a means for restraining movement of a user's hips while the user is seated in said
 - 4 seat; and
 - 5 at least a pair of grips wherein a first grip is positioned at a left side of said seat and a second grip is positioned at a right side of said seat.
1. The stretching apparatus of claim 1 wherein each of said pair of said grips is
- 2 positioned behind a plane passing through said back side of said seat.
1. The stretching apparatus of claim 2 wherein each of said pair of grips is a vertical pole
- 2 which parallels a z-axis passing through said seat.
1. The stretching apparatus of claim 2 wherein each of said pair of grips is connected to a
- 2 wire or cable.
1. The stretching apparatus of claim 4 wherein said wire or cable is connected to a
- 2 moveable mass.
1. The stretching apparatus of claim 2 wherein each of said pair of grips is connected to a

2 support positioned behind said back side of said seat.

1 7. The stretching apparatus of claim 6 wherein said support is connected to said seat.

1 8. The stretching apparatus of claim 2 further comprising a means for adjusting a height
2 of said grips above said seat.

1 9. The stretching apparatus of claim 8 wherein said means for adjusting includes a
2 support member for supporting said grips and a means for moving said grips up and down
3 said support member and for holding said grips at a desired height on said support
4 member.

1 10. The stretching apparatus of claim 2 further comprising a means for adjusting a
2 location of said grips relative to said left and right sides of said seat.

1 11. The stretching apparatus of claim 10 wherein said means for adjusting includes a
2 support member for supporting said grips and a means for pivoting said grips on said
3 support member and holding said grips at a desired pivoted location.

1 12. The stretching apparatus of claim 11 wherein said means for pivoting is positioned
2 on a vertical portion of said support member.

1 13. The stretching apparatus of claim 11 wherein said means for pivoting is positioned
2 on a horizontal portion of said support member.

1 14. The stretching apparatus of claim 11 wherein said means for pivoting includes a
2 ratchet mechanism.

1 15. The stretching apparatus of claim 2 wherein said means for restraining movement of
2 a user's hips comprises a pair of leg supports which move along an arcuate path from a
3 front side of said seat to a left and a right side of said seat.

1 16. The stretching apparatus of claim 15 further comprising a means for holding said leg
2 supports at said left side and said right side of seat by up to approximately 180° apart.

1 17. The stretching apparatus of claim 2 wherein said means for restraining movement of
2 a user's hips comprises a seat back positioned on a back side of said seat, and a means for
3 gripping a user's legs so as to firmly hold a user's back against said seat back.

1 18. The stretching apparatus of claim 1 wherein each of said pair of grips is a vertical
2 pole which parallels a z-axis passing through said seat.

1 19. The stretching apparatus of claim 1 wherein each of said pair of grips is connected to
2 a wire or cable.

1 20. The stretching apparatus of claim 19 wherein said wire or cable is connected to a
2 moveable mass.

- 1 21. The stretching apparatus of claim 1 wherein each of said pair of grips is connected to a support positioned behind said back side of said seat.
- 1 22. The stretching apparatus of claim 21 wherein said support is connected to said seat.
- 1 23. The stretching apparatus of claim 1 further comprising a means for adjusting a height of said grips above said seat.
- 1 24. The stretching apparatus of claim 23 wherein said means for adjusting includes a support member for supporting said grips and a means for moving said grips up and down said support member and for holding said grips at a desired height on said support member.
- 1 25. The stretching apparatus of claim 1 further comprising a means for adjusting a location of said grips relative to said left and right sides of said seat.
- 1 26. The stretching apparatus of claim 25 wherein said means for adjusting includes a support member for supporting said grips and a means for pivoting said grips on said support member and holding said grips at a desired pivoted location.
- 1 27. The stretching apparatus of claim 26 wherein said means for pivoting is positioned on a vertical portion of said support member.
- 1 28. The stretching apparatus of claim 26 wherein said means for pivoting is positioned

2 on a horizontal portion of said support member.

1 29. The stretching apparatus of claim 26 wherein said means for pivoting includes a
2 ratchet mechanism.

1 30. The stretching apparatus of claim 1 wherein said means for restraining movement of
2 a user's hips comprises a pair of leg supports which move along an arcuate path from a
3 front side of said seat to a left and a right side of said seat.

1 31. The stretching apparatus of claim 30 further comprising a means for holding said leg
2 supports at said left side and said right side of seat by up to approximately 180° apart.

1 32. The stretching apparatus of claim 1 wherein said means for restraining movement of
2 a user's hips comprises a seat back positioned on a back side of said seat, and a means for
3 gripping a user's legs so as to firmly hold a user's back against said seat back.

1 33. The stretching apparatus of claim 1 wherein said at least a pair of grips includes a
2 plurality of pairs of grips wherein a first grip and a second grip of each pair of grips is
3 respectively positioned at said left and right side of said seat.

1 34. The stretching apparatus of claim 33 wherein said each pair of grips is positioned at a
2 different angular location with respect to a back side of said seat.

1 35. The stretching apparatus of claim 34 wherein each pair of grips is positioned at a

2 different height relative to said seat.

1 36. The stretching apparatus of claim 33 wherein each of said plurality of pairs of grips is
2 comprised of two vertical poles.

1 37. The stretching apparatus of claim 33 wherein each of said plurality of pairs of grips is
2 connected to a support member positioned at a back side of said seat.

1 38. The stretching apparatus of claim 37 wherein said support member is connected to
2 said seat.

1 39. The stretching apparatus of claim 1 wherein each of said pair of grips is moveable
2 vertically in a plane parallel to a z-axis passing through said seat.

1 40. A stretching apparatus, comprising:

2 a seat having a front side, back side, left side and right side;
3 a means for restraining movement of a user's hips while the user is seated in said
4 seat;
5 a support positioned behind said seat; and
6 at least one grip connected to said support and positioned at or positionable to at
7 least one of said left side and said right side of said seat.

1 41. The stretching apparatus of claim 40 wherein said at least one grip is positioned at or

2 positionable to a position which is in a common plane with or behind said common plane
3 of said back side of said seat.

1 42. The stretching apparatus of claim 40 wherein said support is connected to said seat.

1 43. The stretching apparatus of claim 40 wherein said at least one grip comprises at least
2 one pair of grips each of which are connected to said support, and where a first of said
3 pair of grips is positioned at a left side of said seat and a second of said pair of grips is
4 positioned at a right side of said seat.

1 44. The stretching apparatus of claim 40 wherein said at least one grip comprises at least
2 a plurality of pairs of grips each of which are connected to said support, and where a first
3 of each of said pair of grips is positioned at a left side of said seat and a second of each of
4 said pair of grips is positioned at a right side of said seat.

1 45. The stretching apparatus of claim 44 wherein each of said plurality of pairs of grips
2 are positioned at different heights on said support.

1 46. The stretching apparatus of claim 44 wherein each of said plurality of pairs of grips
2 are positioned at different angular orientations on said support.

1 47. The stretching apparatus of claim 40 wherein said at least one grip is pivotable on
2 said support to a desired angular orientation.

1 48. The stretching apparatus of claim 47 wherein a portion of said support member on
2 which said at least one grip is pivotable is a vertical portion.

1 49. The stretching apparatus of claim 47 wherein a portion of said support member on
2 which said at least one grip is pivotable is a horizontal portion.

1 50. The stretching apparatus of claim 47 wherein said angular orientation is in a vertical
2 plane parallel to a z-axis passing through said seat.

1 51. The stretching apparatus of claim 47 wherein said angular orientation is about a z-
2 axis passing through said seat.

1 52. The stretching apparatus of claim 40 wherein said at least one grip is moveable along
2 said support and settable at a position on said support at distances relatively closer or
3 relatively farther from said seat.

1 53. The stretching apparatus of claim 52 wherein movement is in a vertical axis parallel
2 to a z-axis passing through said seat whereby a height of said grip is set.

1 54. The stretching apparatus of claim 52 wherein movement is in a horizontal axis
2 parallel to an x-y plane passing through said seat.

1 55. The stretching apparatus of claim 52 wherein movement is both in a vertical axis
2 parallel to a z-axis passing through said seat and in a horizontal axis parallel to an x-y

3 plane passing through said seat.

1 56. A stretching method, comprising the steps of:
2 assuming a seated position with hips of a body restrained from rotation;
3 reaching one hand across a front of the body and rotating the body;
4 grasping a grip on an opposite side of the body from said one hand at a position
5 outside a hip on said opposite side of the body; and
6 holding said grip for a period of time.

1 57. The stretching method of claim 56 wherein said step of holding includes the step of
2 pulling on said grip across the body.

1 58. The stretching method of claim 56 wherein said step of holding includes step of
2 exerting a resistance force at said grip.

1 59. The stretching method of claim 58 wherein said resistance force is a mass.

1 60. The method of claim 56 wherein said grasping step is performed on a grip which is
2 positioned behind a plane passing through a back of said seat, and said reaching and
3 rotating step rotates the body about the spine whereby a user's shoulders rotate relative to
4 a z-axis passing through said seat.

1 61. The method of claim 56 further comprising the step of moving said grip to a different

2 angular orientation relative to said seat.

1 62. The method of claim 56 further comprising the step of selecting said grip from
2 among a plurality of grips located at different angular orientations relative to said seat.

1 63. The method of claim 56 further comprising the step of moving said grip a desired
2 distance from said seat.

1 64. The method of claim 63 wherein said moving step moves said grip in a vertical
2 direction parallel to a z-axis passing through said seat.

1 65. The method of claim 63 wherein said moving step moves said grip in a horizontal
2 direction parallel to an x-y plane passing through said seat.

1 66. The method of claim 63 wherein said moving step moves said grip in a vertical
2 direction parallel to a z-axis passing through said seat, and moves said grip in a horizontal
3 direction parallel to an x-y plane passing through said seat.

1 67. The method of claim 56 further comprising the step of measuring a rotation of the
2 body to grip said grip in said grasping step.

1 68. The method of claim 67 further comprising the step of determining changes in
2 rotation of the body to grip said grip based on repetitive performance of said grasping
3 step.

1 69. The method of claim 68 further comprising indicating improvements determined in
2 said determining step to said user.

1 70. The method of claim 56 wherein said assuming step includes the step of opening a
2 user's legs to a point where said hips of said body are restrained from rotation.

1 71. A shoulder stretching method, comprising the steps of:
2 assuming a seated position with hips of a body restrained from rotation;
3 reaching one hand upward to a grip in a manner where an arm is perpendicular to
4 a torso of the body;
5 rotating a forearm of the arm towards vertical while said one hand grips said grip.

1 72. The shoulder stretching method of claim 71 further comprising the step of adjusting a
2 height of said grip above said seat.

1 73. The shoulder stretching method of claim 71 wherein said step of assuming step
2 includes the step of opening a user's legs to a point where said hips of said body are
3 restrained from rotation.

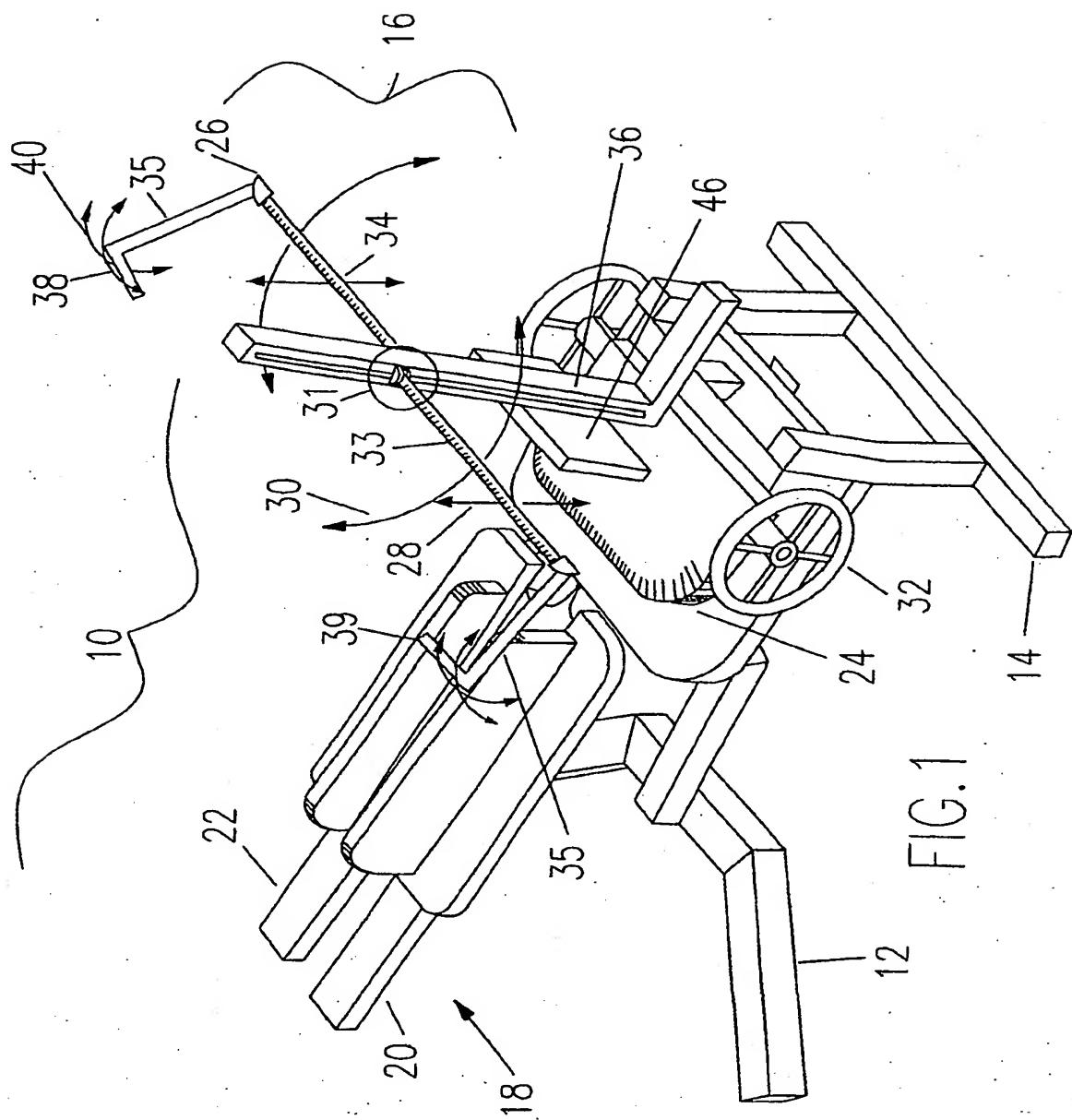


FIG. 1

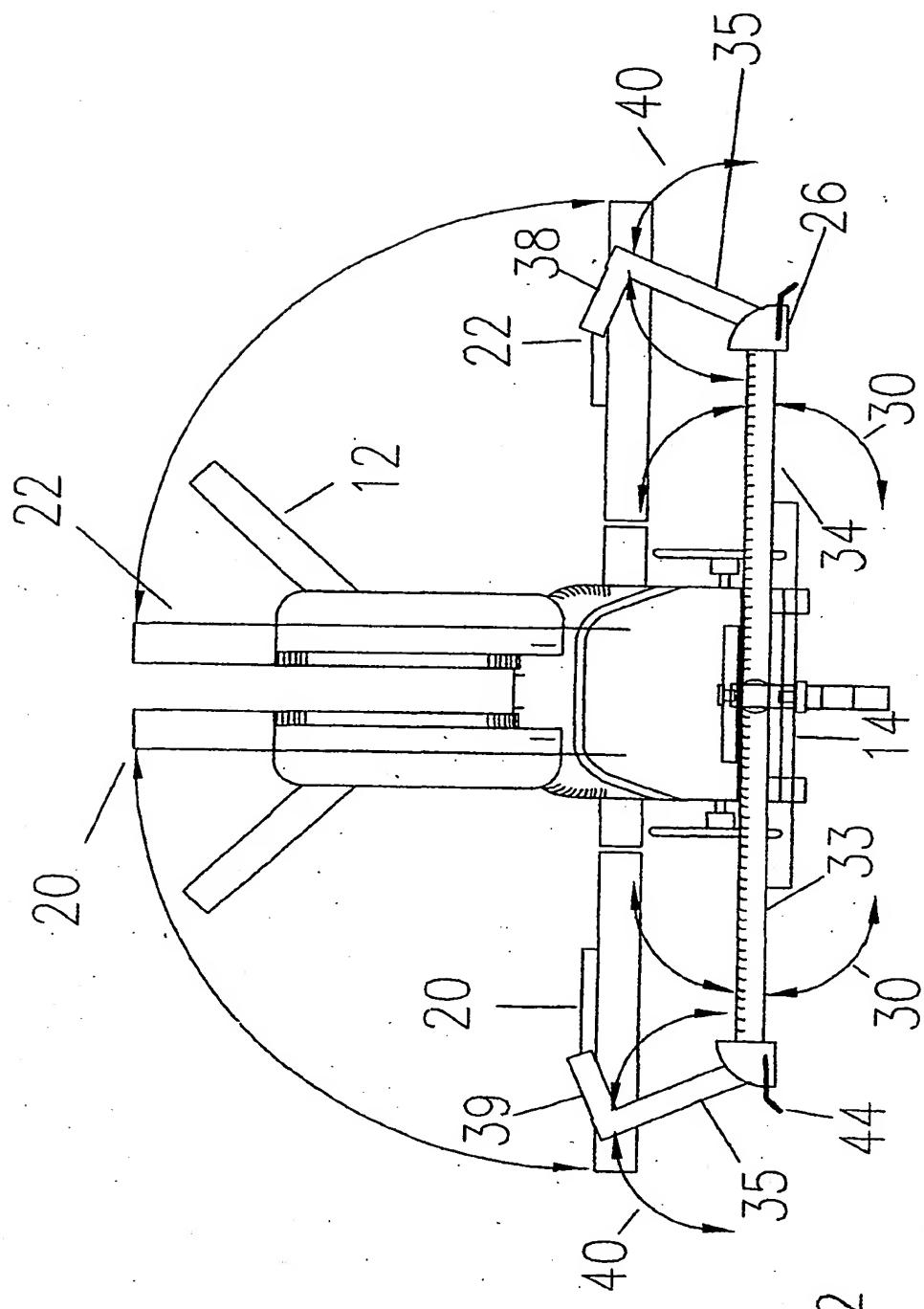
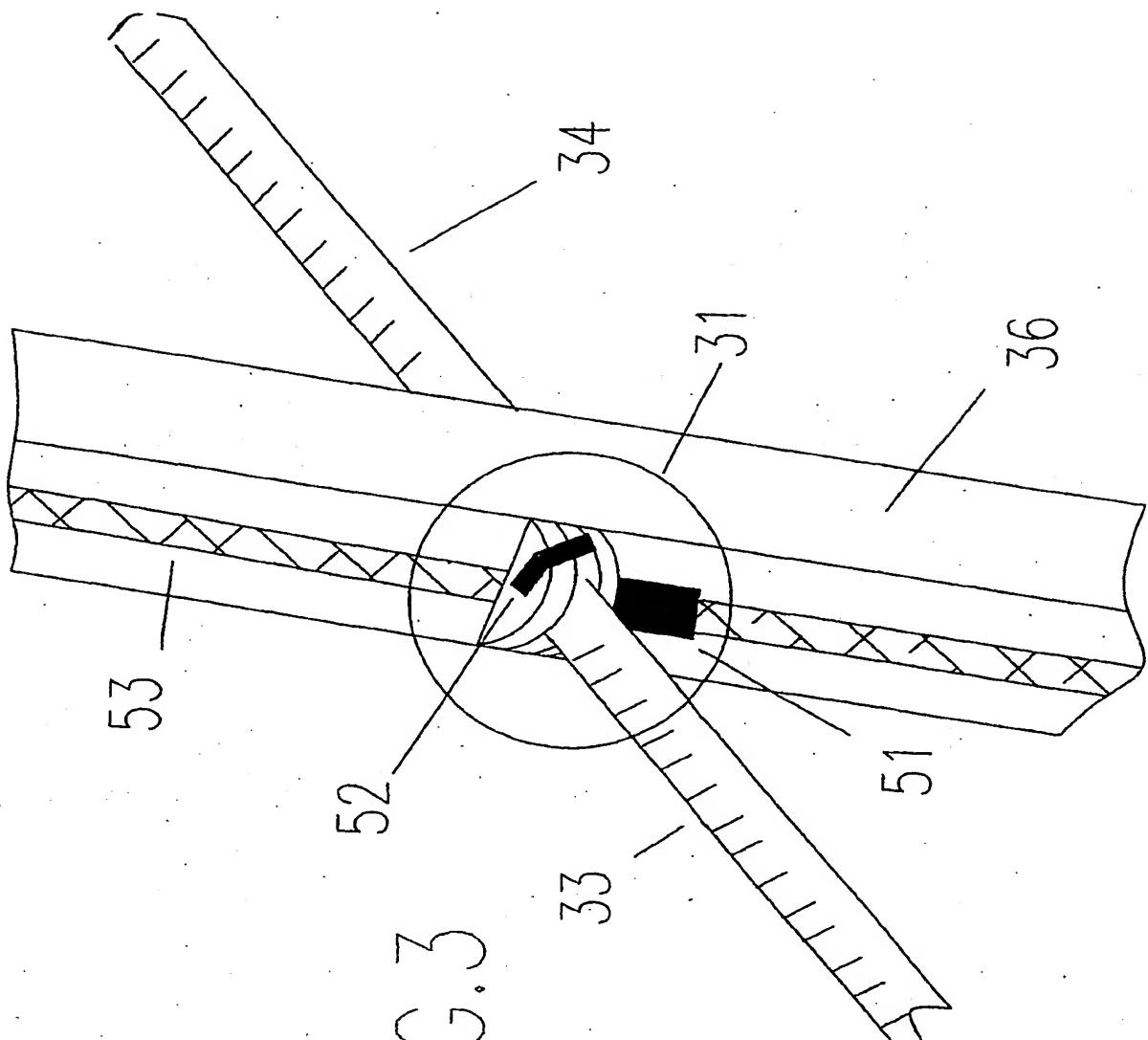
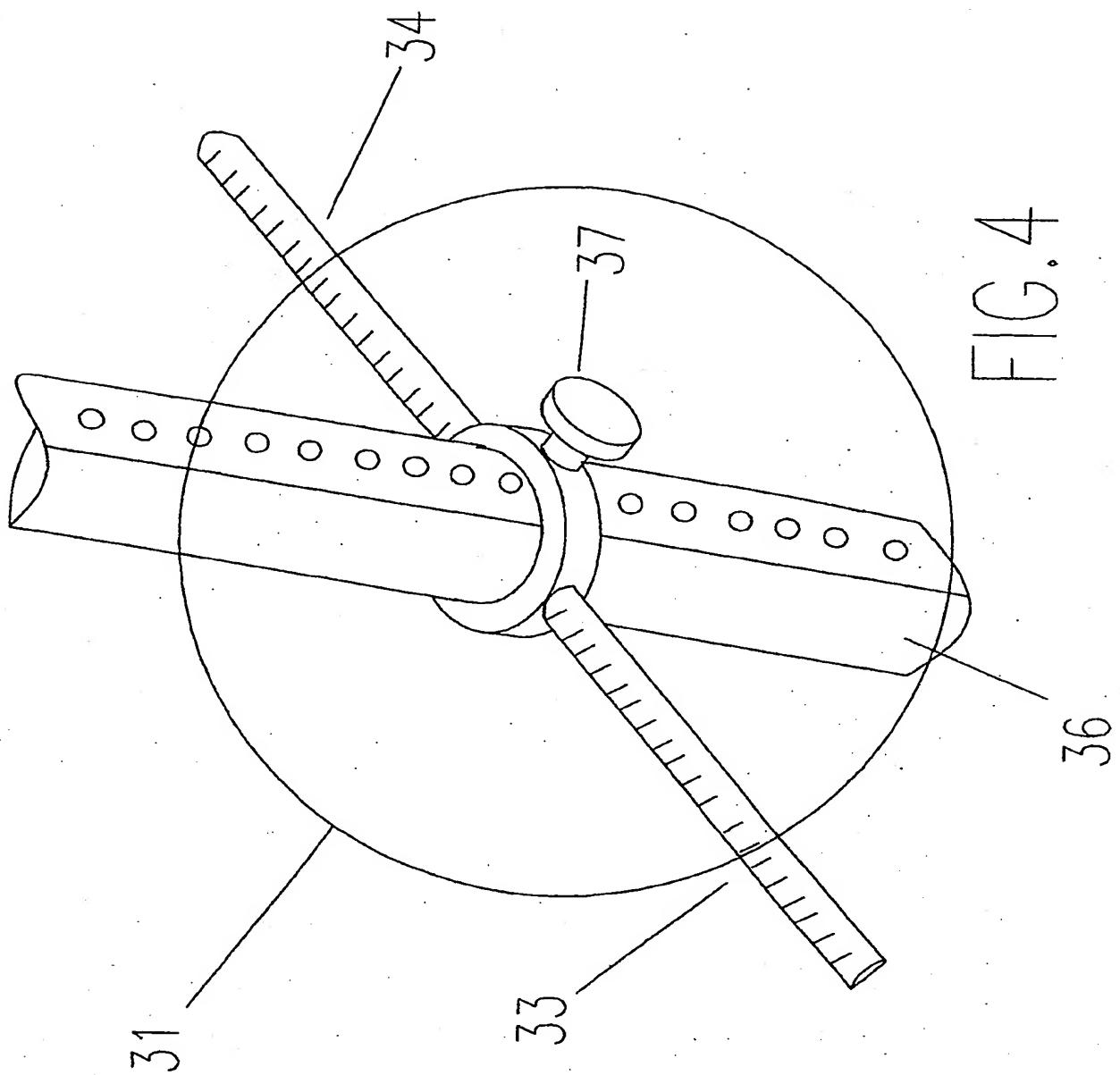


FIG. 2





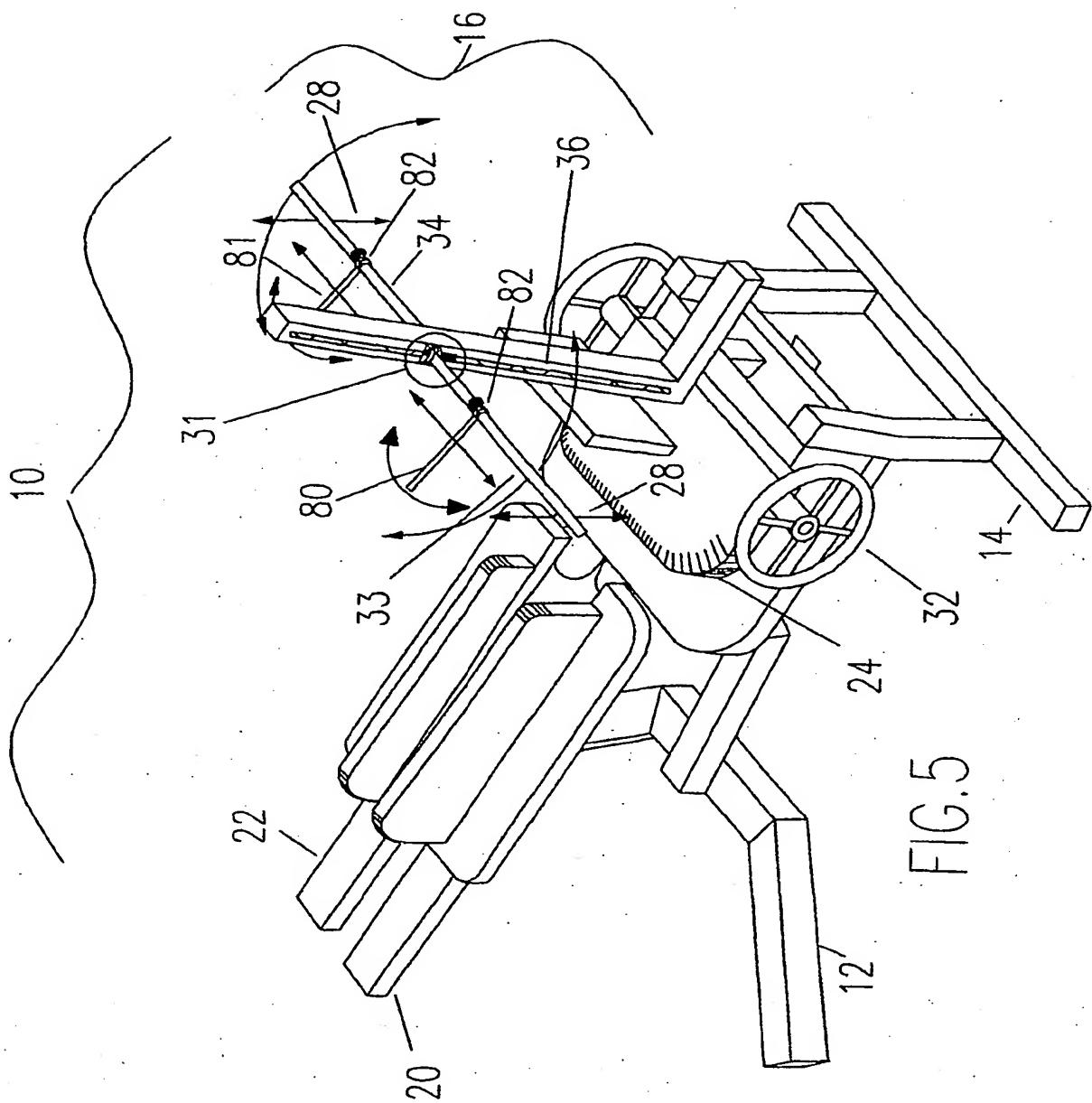
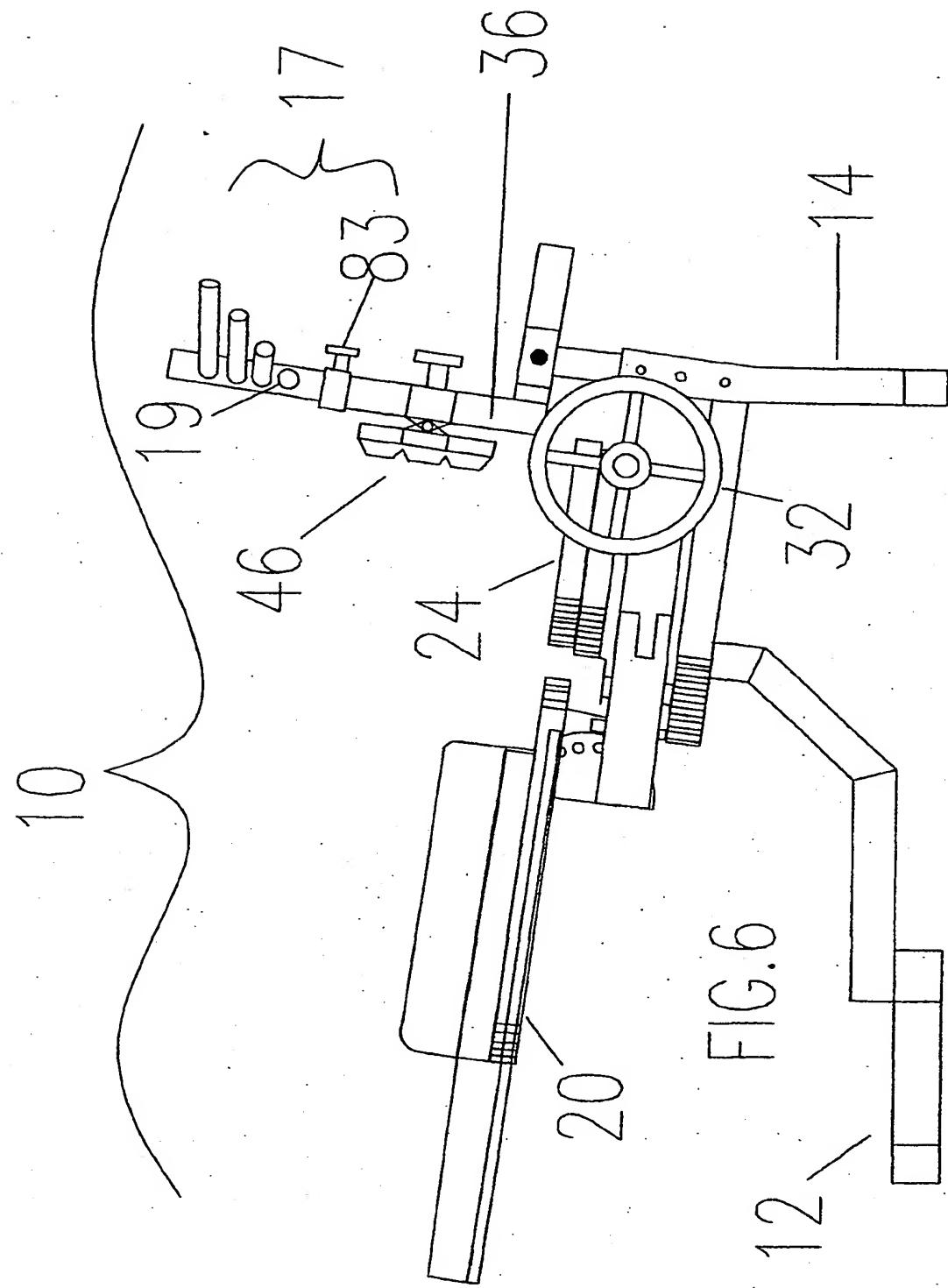
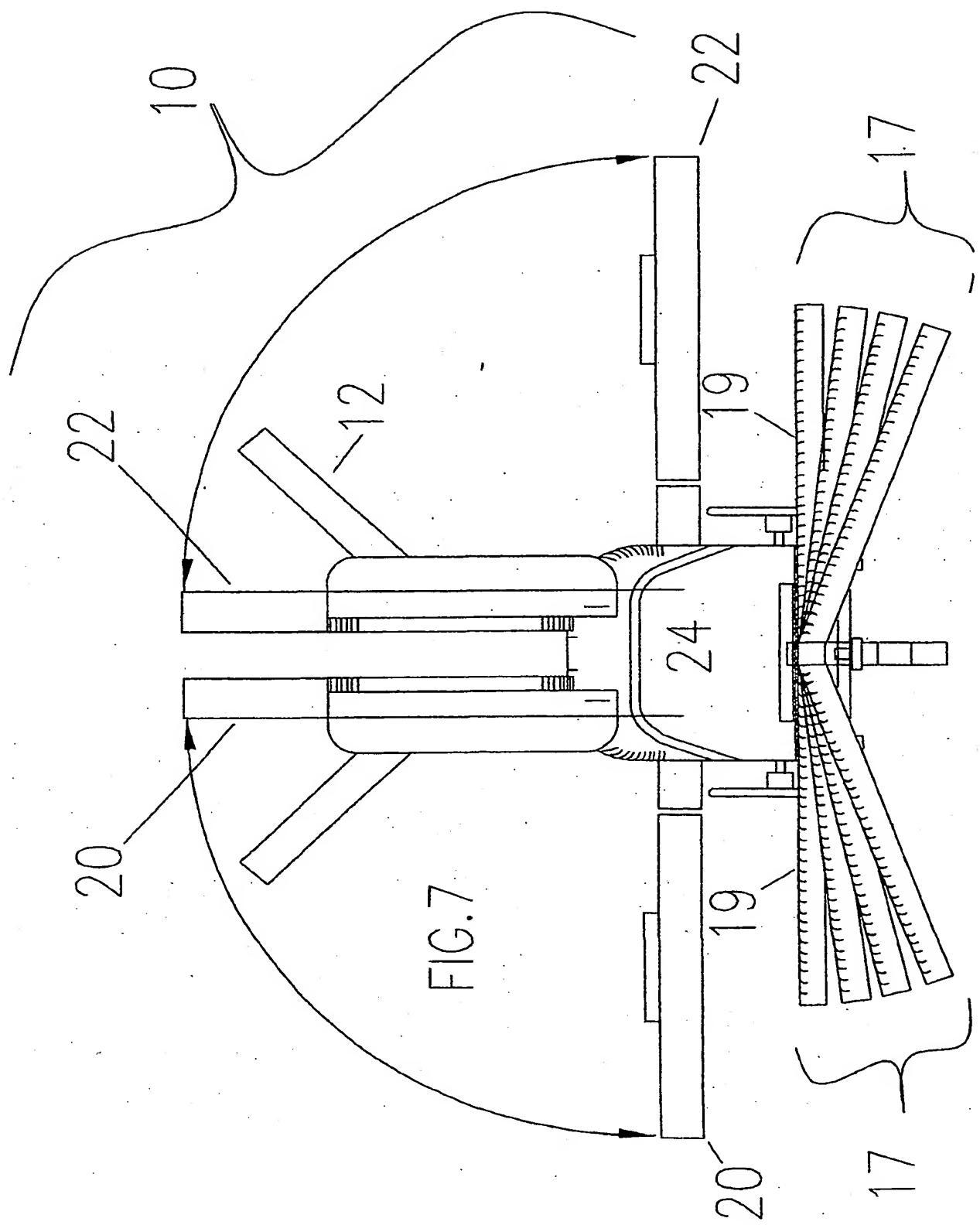
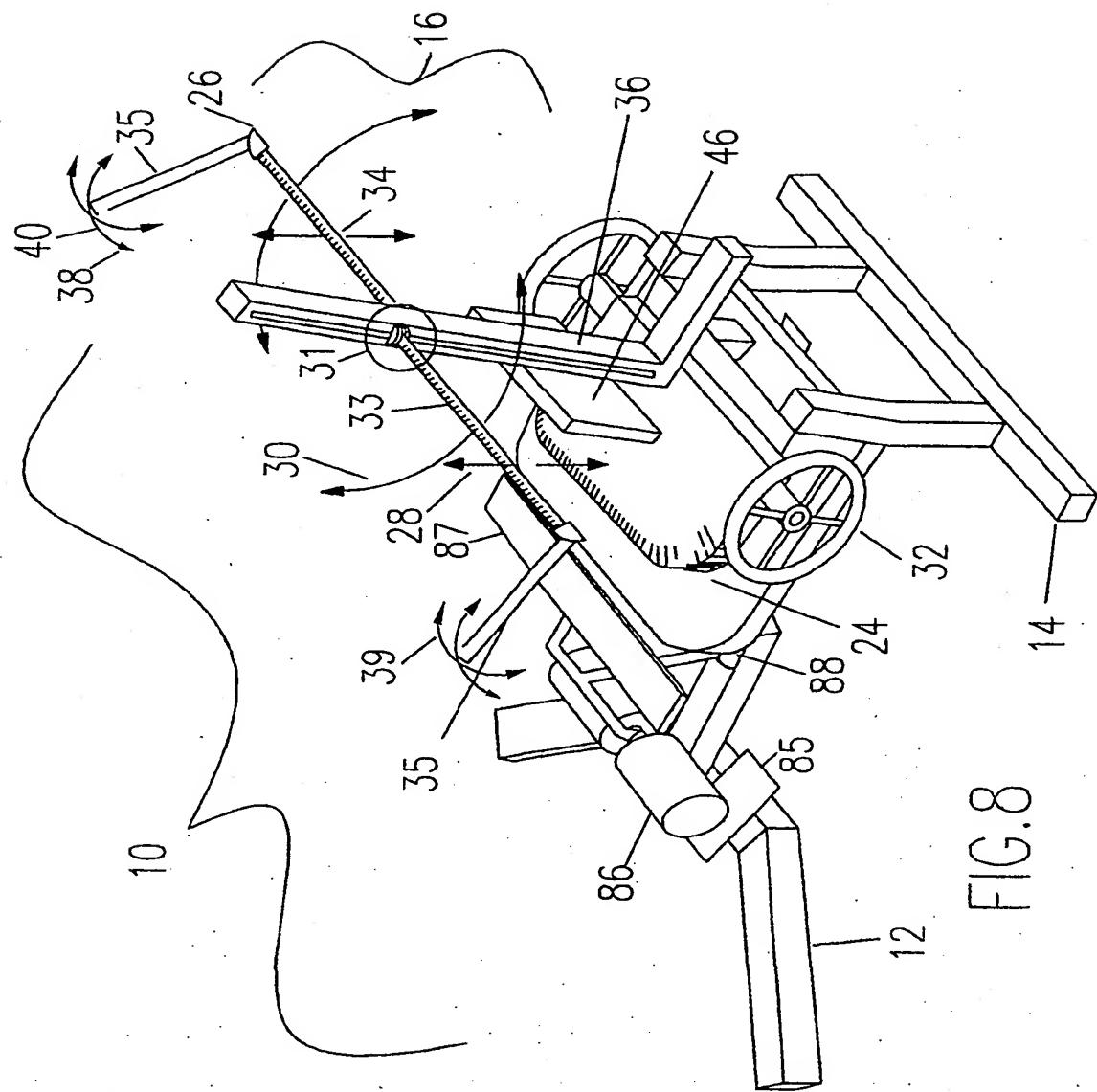


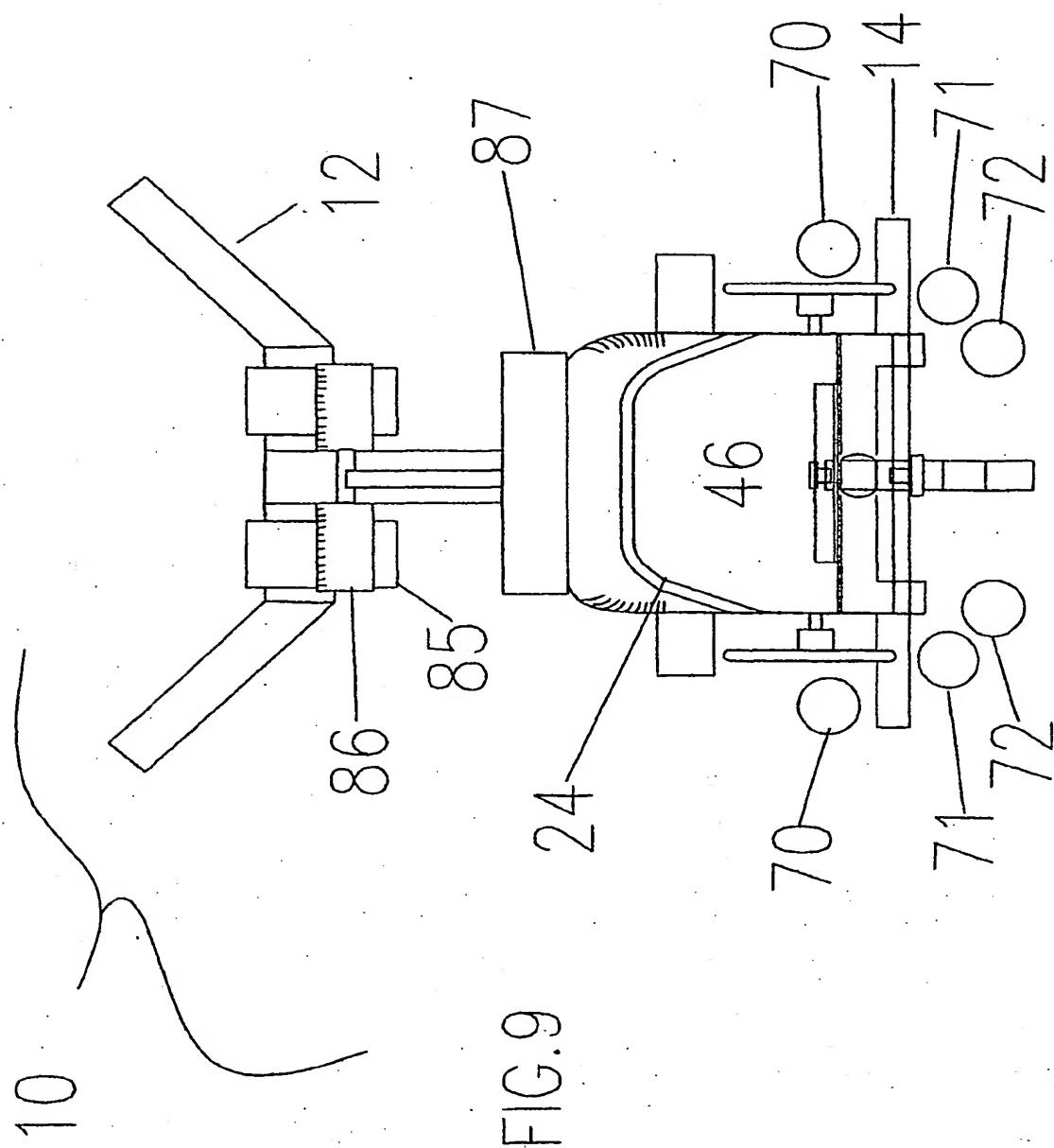
FIG. 5







8.
G.
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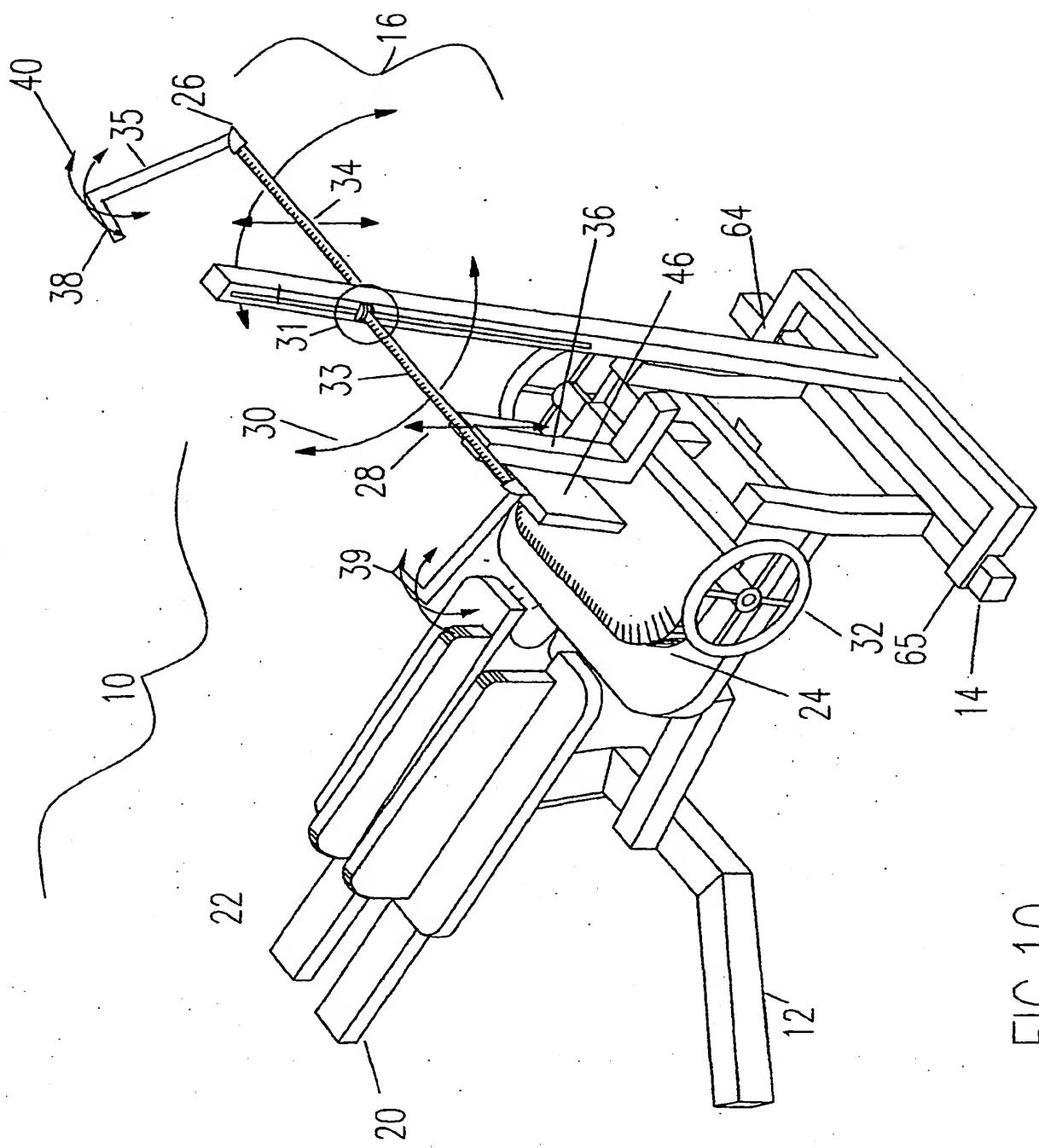


FIG. 10

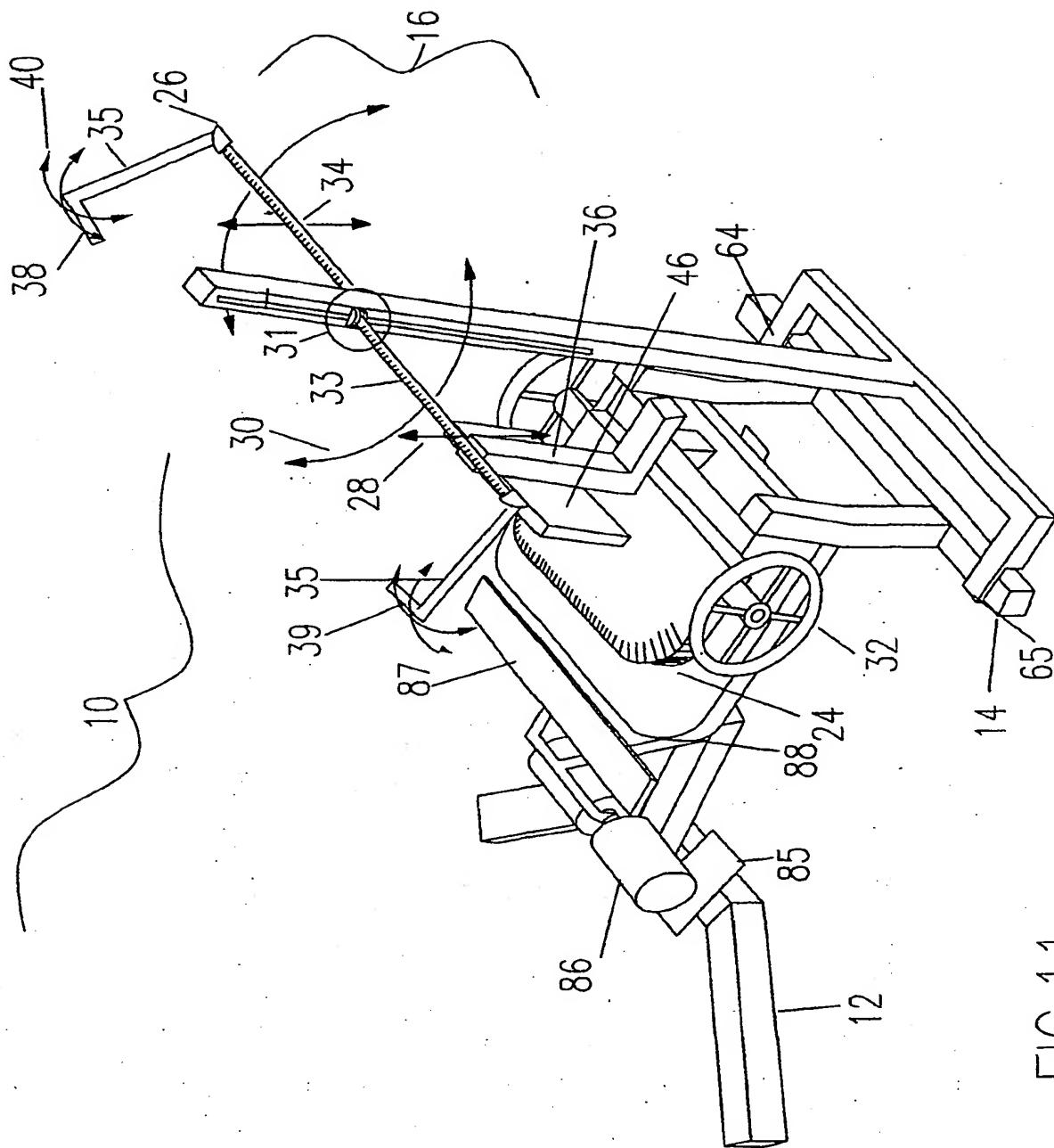


FIG. 11

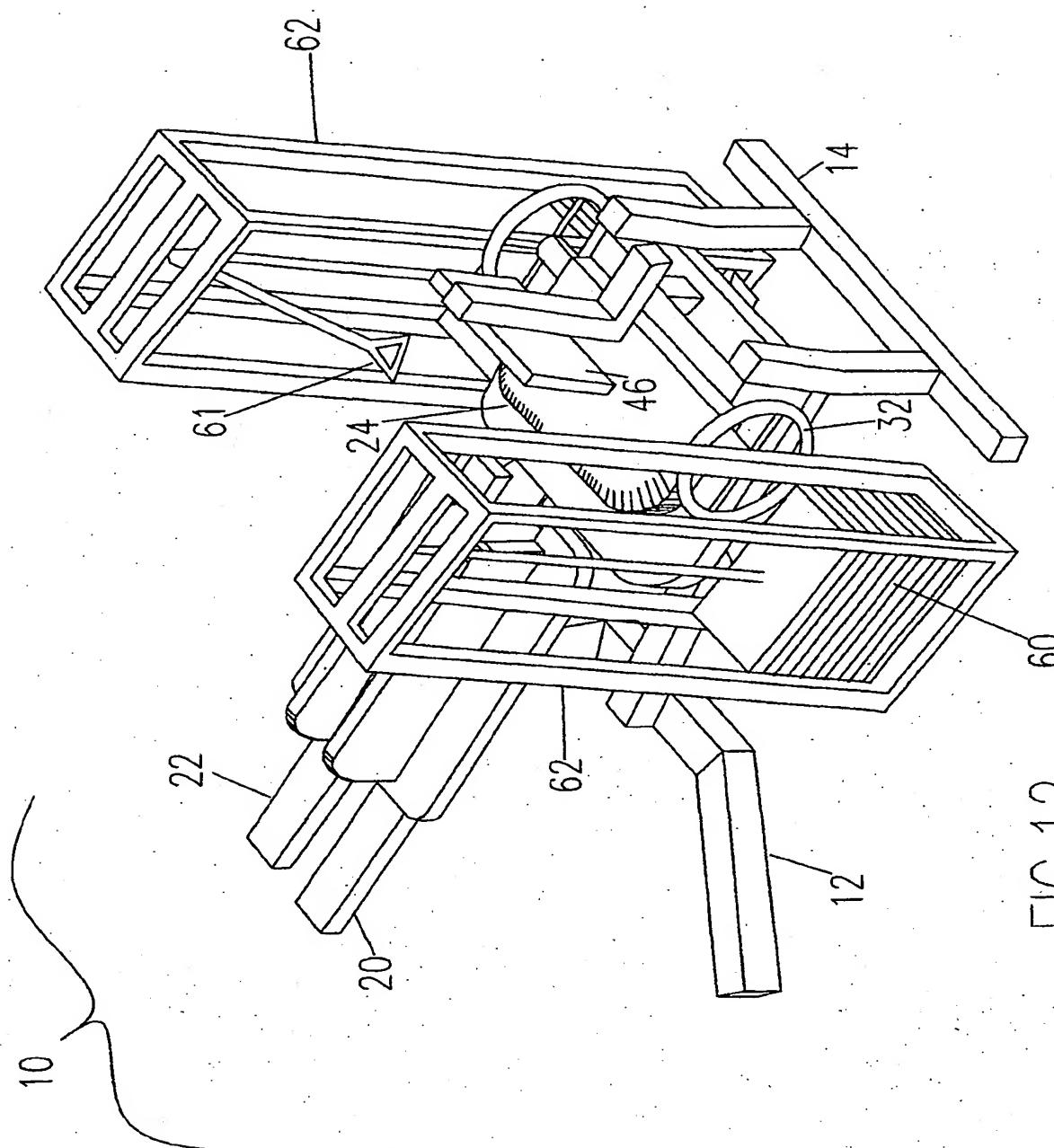


FIG. 12